

REMARKS

The Applicants appreciate the thoroughness with which the subject patent application has been examined. By this amendment, claims 2 and 6 have been amended to overcome the Examiner's rejections and more concisely claim and describe the present invention. Claims 1-30 remain in the application for reconsideration by the Examiner. The Examiner's allowance of all pending claims is earnestly solicited.

MATTERS RELATED TO THE SPECIFICATION

The Applicants have identified two typographical informalities in the specification and propose to correct those informalities as indicated above in the marked-up specification paragraphs.

MATTERS RELATED TO THE CLAIMS

The Examiner has rejected claims 1-12, 14-16, 18 and 25-28 under Section 102(e) as anticipated by Chen (6,660,622).

The Examiner is invited to reconsider the rejection of claim 1, as Chen does not disclose or suggest, "controlling power supplied to the target to maintain the wafer temperature below a critical temperature, wherein at a wafer temperature above the critical temperature the material of the first material layer can extrude into one or more of the plurality of openings." In fact, neither the word "temperature" nor the word "extrude" appears in the Chen reference.

Instead, Chen discloses a process for, "removing a barrier layer formed at the bottom of a via by a sputter etching process performed in a plasma sputter deposition chamber. The same sputter deposition chamber may be advantageously used to then deposit a second barrier layer." The two steps of sputtering the wafer to remove the barrier layer and the sputtering step to deposit the second barrier layer are, "differentiated by power applied to the target, by chamber pressure, or by wafer bias." Chen further states at column 4, beginning at line 64, "the IMP chamber allows the formation of an argon plasma without sputtering the tantalum target by exciting the plasma through the inductive coil and not significantly DC biasing the target. The highly directional high-energy argon ions incident on the wafer remove or sputter

the CVD barrier bottom and field portions 32, 36. That is, a sputtering process is performed on the wafer, not a sputter deposition process.” Thus, not only is Chen patentably distinguished due to its failure to disclose or suggest the Applicants’ concepts related to wafer temperature and extrusion, but further achieves a sputtering process without applying significant DC bias to the target. By contrast, the Applicant’s, “control[ing] power supplied to the target to maintain the wafer temperature.”

Dependent claim 2 has been revised as set forth above to more concisely claim the present invention. In particular, the claim now reads in part, “increasing the power supplied to the target to increase a deposition rate of target material particles on the wafer above a deposition rate at which the first material layer can extrude into one or more of the plurality of openings.”

With respect to the rejection of dependent claims 2-4, the Applicants note that each of these dependent claims include one or more elements that further distinguish the invention over the art of record. Dependent claims 2-4 should therefore be in condition for allowance.

As to the rejection of independent claim 5 over Chen, the Applicants note that the claim includes the step of, “supplying power to the target to maintain the wafer temperature below a critical temperature, wherein at a wafer temperature above the critical temperature the material of the first material layer can extrude into the plurality of openings.” Since the cited Chen reference does not mention wafer temperature or layers that can extrude into openings, claim 5 should be in condition for allowance over Chen.

With respect to dependent claims 6-12, 14-16, and 18, all depending directly or indirectly from independent claim 5 and rejected over Chen, it is respectfully submitted that each of these dependent claims further distinguishes over the art of record.

Dependent claims 13 and 17, depending from claim 5, stand rejected under Section 103(a) as unpatentable over Chen in view of Gopalraja (6,193,855). These claims are also believed to be allowable as each further distinguishes the invention from claim 5 from which they depend.

Claims 19-24 stand rejected under Section 102(b) as anticipated by Gopalraja.

Independent claim 19 recites the step of, “forming an electric field in a region of the target,” and “controlling the electric field to maintain the wafer temperature below a critical temperature, above which wafer features can sustain damage.”

Gopalraja discloses a technique related to the problem of material re-sputtering. “During a period of plasma decay, a bias to a substrate support member is increased to a relatively higher power, thereby periodically enhancing the attraction of positively charged particles to the substrate during the afterglow period of the plasma. The plasma decay is achieved by terminating the coupling of energy into the gases. In one embodiment, a bias to the target is also modulated.” Gopalraja’s objective is to achieve conformal step coverage while avoiding re-sputtering of the deposited material from the substrate by the inert plasma gas ions.

It is respectfully suggested that it is not possible for the Gopalraja patent to disclose or suggest the Applicants’ invention as set forth in claim 1 as the wafer temperature parameter is not mentioned in the Gopalraja patent. It is therefore submitted that the Applicants’ invention as described by independent claim 19 is patentably distinct from the disclosure of Gopalraja.

With respect to dependent claims 20-24, depending from independent claim 19, it is respectfully submitted that each of these dependent claims further distinguish the invention over the art of record and include one or more elements in conjunction with the elements of claim 19 that are not present in the art of record.

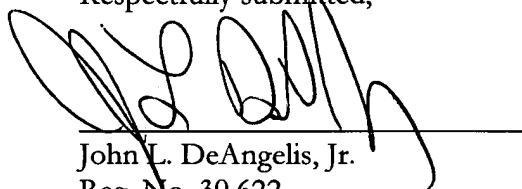
Given the lack of relevant disclosure in Chen and Gopalraja, neither of these references alone nor their combination (assuming that there is relevant disclosure in one of the references that permits the combination) is sufficient to support an obviousness rejection of the Applicant’s invention as set forth in claims 1-30.

The Applicants have attempted to comply with all of the points raised in the Office Action and it is believed that the remaining claims in the application, i.e., claims 1-30, are now in condition for allowance. In view of the foregoing amendments and discussion, it is requested that the Examiner’s claim rejections have been overcome. It is respectfully requested that the Examiner reconsider his rejections and objections and issue a Notice of Allowance for all the claims pending in the application.

The Applicants hereby petition for an extension of time of one month under the provisions of 37 C.F.R. 1.136. A check in the amount of \$120 payable to the Commissioner for Patents is enclosed in payment of the extension fee.

If a telephone conference will assist in clarifying or expediting this Amendment or the claim changes made herein, Examiner Brewster is invited to contact the undersigned at the telephone number below.

Respectfully submitted,



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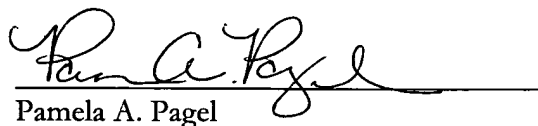
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CERTIFICATE OF MAILING

I HEREBY CERTIFY that this Amendment is being deposited with the U.S. Postal Service as first class mail in an envelope addressed to: Mail Stop Fee Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 21st day of January, 2005.



Pamela A. Pagel